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CPJ

Swirl **Diffuser**

KES KLIMA
AIR CONTROL SYSTEMS

Description

The CPJ type diffusers are designed for high ceiling applications. They can be used for supply air.

Properties

The CPJ type diffusers have adjustable blades. The blades are adjusted to vertical throw for heating, and to horizontal for cooling. If a proportional servomotor is used, it is possible to have continuous adjustments between vertical and horizontal. These diffusers are mostly good for applications in industrial or commercial buildings.Samples for usage are; factories, airports, supermarkets, sports halls, etc. If the diffuser face is installed more than 300 mm below the ceiling, then Coanda effect does not take place and it is possible to have continuous throw angle adjustments between the vertical and the horizontal. However, if the diffuser face is close to the ceiling, then only a vertical or a horizontal throw setting is possible. In cases where the diffuser is apart from the ceiling, and a longer horizontal throw is desired; then a compensator plate is introduced around the diffuser face for some limited horizontal throw enhancement. These diffusers are recommended for use with a supply air temperature difference of (+/-) 10^{o}C. The production range consists of 4 sizes; 425x425, 595x595, 775x775 and 1050x1050 mm.

Materials

The frame and the blades are manufactured from ETIAL-60 norm aluminium profiles.

Surface Treatment

The surfaces of the diffusers are first cleaned, then treated with chromating process; after which, are painted electrostatically, with 20% gloss RAL 9010 (white) as standard. Other colours are also available upon request.

Accessories

Protection Cage

Manufactured from steel rods for protecting the diffuser from receiving hits in sports halls, the cage is formed as 25x25 mm square mesh.

Perforated Plate

Used in plenum boxes with top inlet, for equalizing the air flow before the diffuser blades. This plate is made of perforated galvanized steel sheet.

Compensator Plate

In cases where the diffuser is apart from the ceiling, and a longer horizontal throw is desired; then a compensator plate is introduced around the diffuser face for some limited horizontal throw enhancement. This plate is made from aluminium sheet.

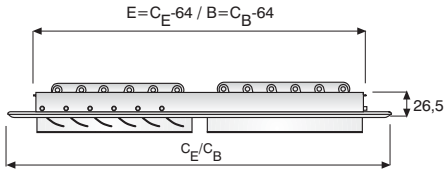
Plenum Box

The plenum box is used to achieve optimum throw characteristics. It has the inlet either at the top or at one side. Depending on request, a damper can be installed at the inlet, which can be operated internally or externally (has to be specified with the order). The plenum boxes are made from 0.6 mm thick galvanized steel sheets and have 4 hanging brackets on their body. Optionally, a 6 mm thick acoustic foam can be laid inside the plenum box.

Dimensions

Standard Dimensions (mm)

C_E x C_B (K_E / K_B)	H	H1	ØD	F	J
425 x 425	500	650	244	550	300
595 x 595	550	750	305	750	350
775 x 775	550	900	446	1150	500
1050 x 1050	600	1050	498	1150	550



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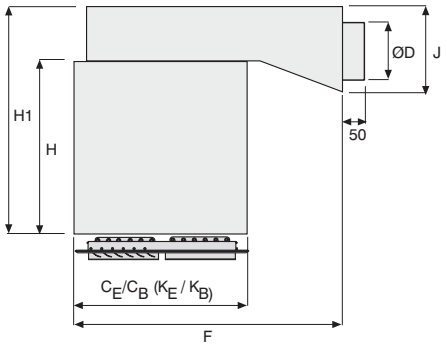
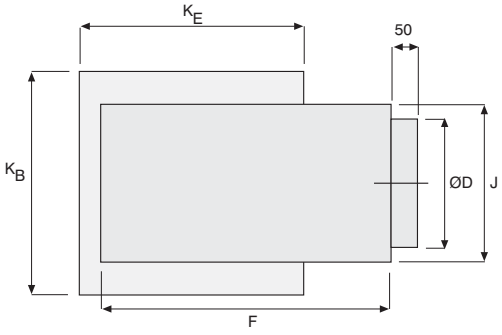
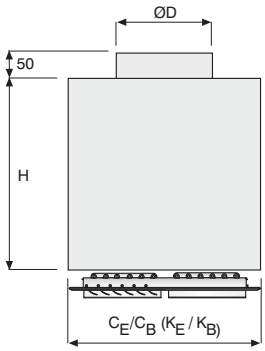
Side inlet

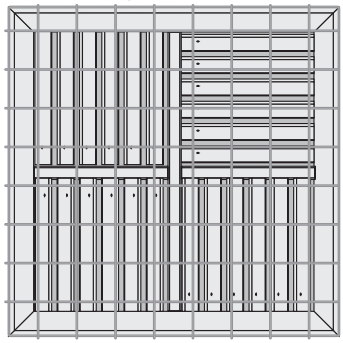




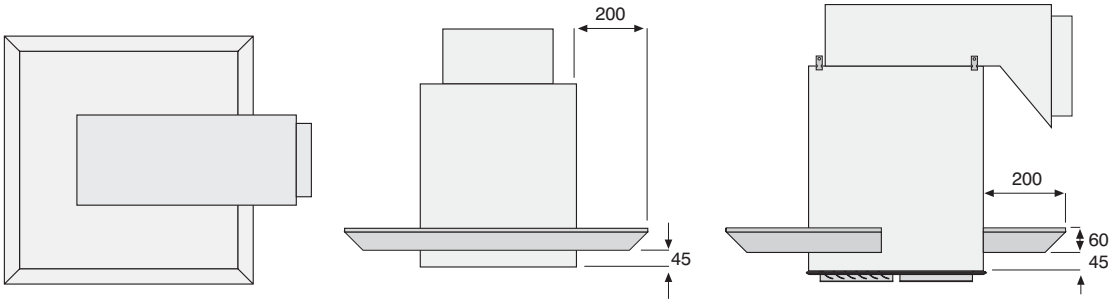
Top inlet



With protection cage

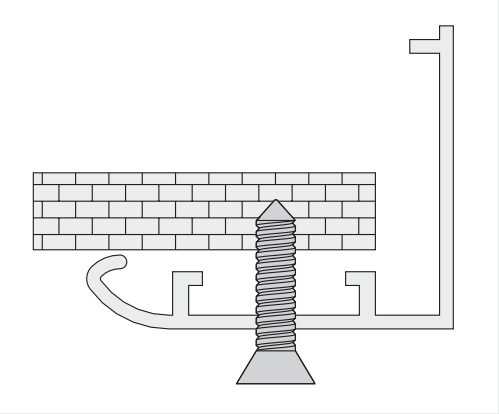


With compensator plate



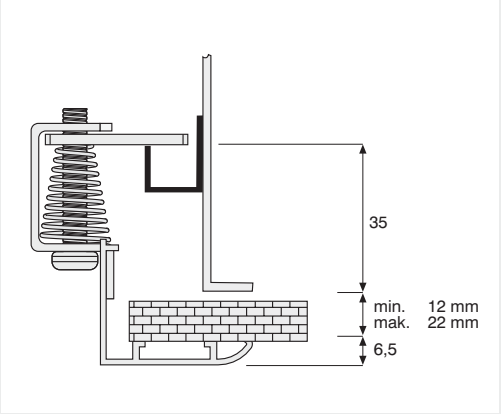
Installation

With screws



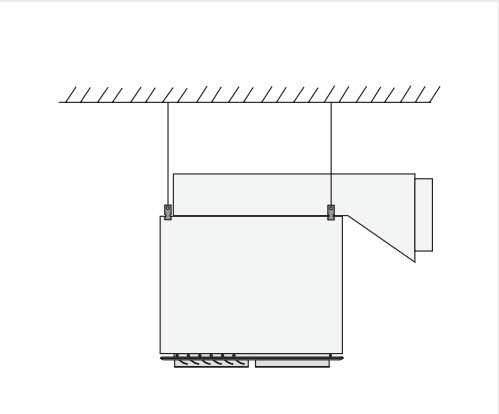
A set of self-drilling screws Ø4,2 x 38 mm, painted the same colour, are given with the product.

Concealed fixing



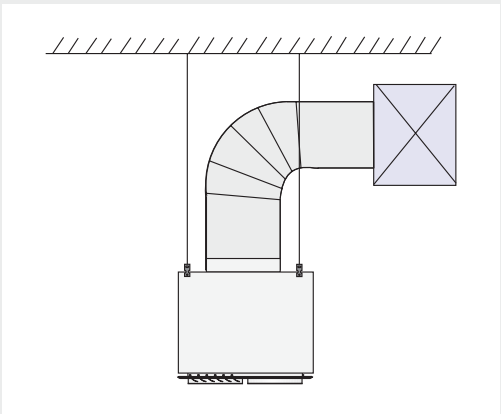
Suitable for ceiling thicknesses of 12-22 mm. For other thicknesses, please contact us.

Plenum Box Installation (Side inlet)



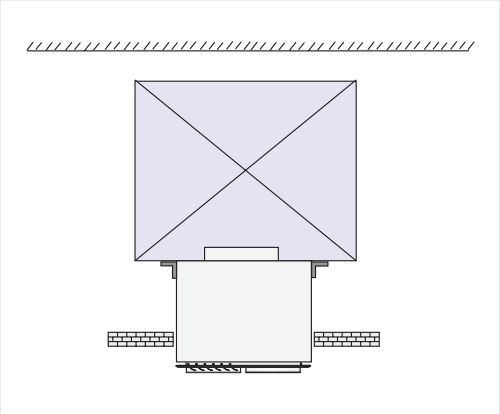
There are 4 hanging brackets on the box as standard

Plenum Box Installation (Top inlet)

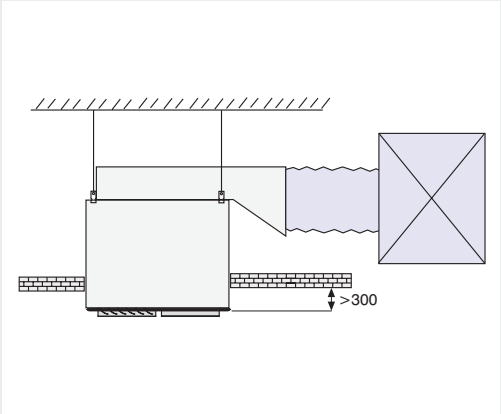


There are 4 hanging brackets on the box as standard

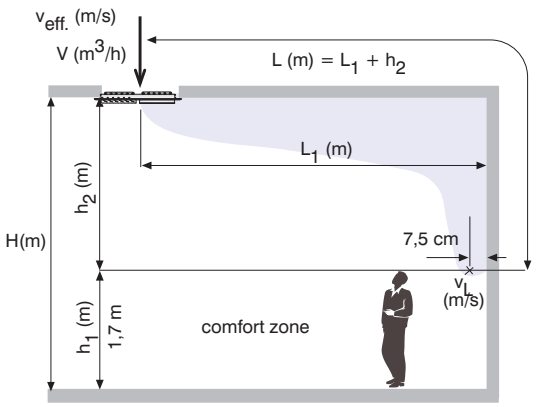
Flush Installation With Ceiling

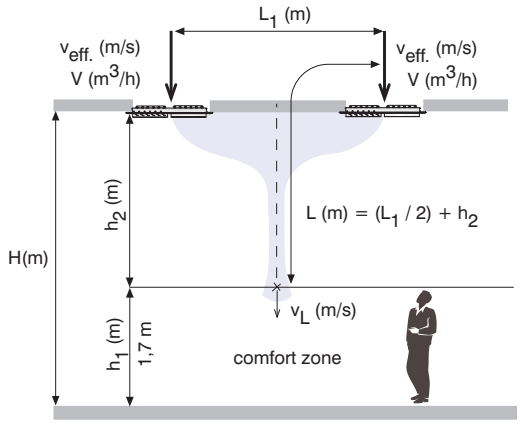


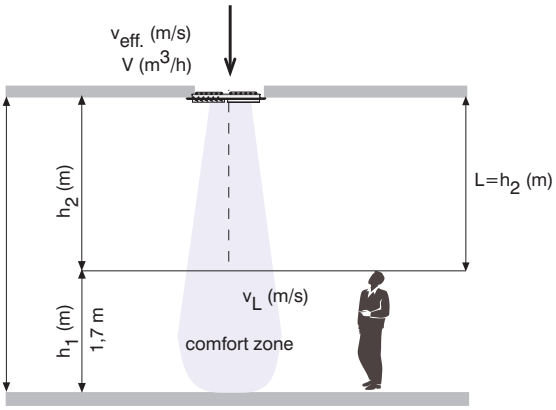
Apart Installation From Ceiling



Nomenclature





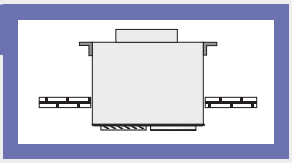


L_1	Distance between diffuser centres or diffuser centre and wall. (m)
h1	Comfort zone height (m)
h2	Distance between a diffuser and comfort zone (m)
$v_{efek.}$	Effective outlet velocity (m/s)
v_L	Velocity of core in comfort zone
Δt_0	Difference between supply air and room temperature (^oC)
Δt_L	Difference between core and comfort zone temperature (^oC)
L	Throw distance (m)
V	Air flow rate (m3/h)
H	Room height (m)
S	Sound power level dB(A)

To achieve "Coanda effect", the outlet velocity must be greater than 2m/s. The general comfort conditions require that the sound power level is below 40 dB(A). The height of the comfort zone is taken as 1.70m above the floor. It is important that 0.25 m/s core velocity is not exceeded in this zone.

Technical Data

Cooling (Apart installation from the ceiling)



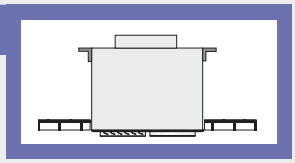
Top inlet

Dimensions C_E/C_B (mm)	Flow Rate V (m^3/h)	Throw, L (m) v_L=0,25 m/s	Throw, L (m) v_L=0,10 m/s	Pressure loss ΔP (Pa)	Sound power level S (dB(A))
425	550	2,30	5,25	15	34
	775	3,40	7,75	30	44
	1000	4,20	9,80	52	51
	1225	5,20	12,10	75	56
	1450	6,10	14,10	100	61
595	1100	3,05	7,20	16	36
	1550	4,60	11,00	32	45
	2000	5,75	13,60	52	52
	2450	6,90	16,50	80	58
	2900	8,30	19,60	110	63
775	1250	2,70	6,15	7	21
	2200	4,90	11,25	22	37
	3150	7,00	15,75	44	47
	4100	9,20	19,00	74	55
	5050	11,10	23,00	110	60
1050	1400	2,25	5,05	4	<20
	2750	4,05	9,20	14	30
	4100	6,40	14,40	32	41
	5450	8,40	19,30	58	50
	6800	10,50	23,70	85	55

Side inlet

Dimensions C_E/C_B (mm)	Flow Rate V (m^3/h)	Throw, L (m) v_L=0,25 m/s	Throw, L (m) v_L=0,10 m/s	Pressure loss ΔP (Pa)	Sound power level S (dB(A))
425	550	2,30	5,25	21	35
	775	3,40	7,75	44	45
	1000	4,20	9,80	75	52
	1225	5,20	12,10	108	57
	1450	6,10	14,10	150	62
595	1100	3,05	7,20	26	38
	1550	4,60	11,00	52	43
	2000	5,75	13,60	85	55
	2450	6,90	16,50	130	61
	2900	8,30	19,60	180	65
775	1250	2,70	6,15	8	25
	2200	4,90	11,25	25	42
	3150	7,00	15,75	52	52
	4100	9,20	19,00	85	60
	5050	11,10	23,00	130	65
1050	1400	2,25	5,05	6	20
	2750	4,05	9,20	18	26
	4100	6,40	14,40	40	49
	5450	8,40	19,30	72	57
	6800	10,50	23,70	110	63

Cooling (Flush installation with ceiling)



Top inlet

Dimensions C_E/C_B (mm)	Flow Rate V (m^3/h)	Throw, L (m) v_L=0,25 m/s	Throw, L (m) v_L=0,10 m/s	Pressure loss ΔP (Pa)	Sound power level S (dB(A))
425	550	3,20	7,35	15	34
	775	4,70	10,85	30	44
	1000	5,80	13,70	52	51
	1225	7,25	16,90	75	56
	1450	8,50	19,70	100	61
595	1100	4,20	10,00	16	36
	1550	6,40	15,40	32	45
	2000	8,00	19,00	52	52
	2450	9,60	23,10	80	58
	2900	11,60	27,40	110	63
775	1250	3,75	8,55	7	21
	2200	6,80	15,75	22	37
	3150	9,80	22,05	44	47
	4100	12,80	26,60	74	55
	5050	15,50	32,20	110	60
1050	1400	3,15	7,05	4	<20
	2750	5,65	12,80	14	30
	4100	8,90	20,10	32	41
	5450	11,70	27,00	58	50
	6800	14,60	33,10	85	55

Side inlet

Dimensions C_E/C_B (mm)	Flow Rate V (m^3/h)	Throw, L (m) v_L=0,25 m/s	Throw, L (m) v_L=0,10 m/s	Pressure loss ΔP (Pa)	Sound power level S (dB(A))
425	550	3,20	7,35	21	35
	775	4,70	10,85	44	45
	1000	5,80	13,70	75	52
	1225	7,25	16,90	108	57
	1450	8,50	19,70	150	62
595	1100	4,20	10,00	26	38
	1550	6,40	15,40	52	43
	2000	8,00	19,00	85	55
	2450	9,60	23,10	130	61
	2900	11,60	27,40	180	65
775	1250	3,75	8,55	8	25
	2200	6,80	15,75	25	42
	3150	9,80	22,05	52	52
	4100	12,80	26,60	85	60
	5050	15,50	32,20	130	65
1050	1400	3,15	7,05	6	20
	2750	5,65	12,80	18	26
	4100	8,90	20,10	40	49
	5450	11,70	27,00	72	57
	6800	14,60	33,10	110	63

Heating, with different throw angles with the horizontal

45° Throw with the horizontal

45°	Dimensions (mm)	Flow Rate V (m^3/h)	Penetration	
			Δt_O = 10° C	Δt_O = 15° C
	425	550	1,50	1,25
		775	2,00	1,70
		1000	2,45	2,10
		1225	3,00	2,50
		1450	3,40	2,80
	595	1100	1,80	1,45
		1550	2,35	2,00
		2000	2,95	2,50
		2450	3,50	2,90
		2900	4,00	3,35
	775	1250	1,40	1,20
		2200	2,30	1,90
		3150	3,00	2,60
		4100	3,85	3,20
		5050	4,55	3,80
	1050	1400	1,00	0,85
		2750	1,85	1,55
		4100	2,60	2,18
		5450	3,25	2,70
		6800	3,90	3,30

60° Throw with the horizontal

60°	Dimensions (mm)	Flow Rate V (m^3/h)	Penetration	
			Δt_O = 10° C	Δt_O = 15° C
	425	550	1,80	1,60
		775	2,60	2,20
		1000	3,40	2,80
		1225	4,00	3,50
		1450	4,90	4,15
	595	1100	2,20	1,85
		1550	3,15	2,60
		2000	4,00	3,50
		2450	5,00	4,20
		2900	5,95	5,00
	775	1250	1,70	1,40
		2200	3,00	2,50
		3150	4,20	3,60
		4100	5,60	4,75
		5050	7,00	5,75
	1050	1400	1,15	1,00
		2750	2,30	1,90
		4100	3,50	2,90
		5450	4,65	3,90
		6800	5,80	4,85

75° Throw with the horizontal

75°	Dimensions (mm)	Flow Rate V (m^3/h)	Penetration	
			Δt_O = 10° C	Δt_O = 15° C
	425	550	2,20	1,80
		775	3,20	2,70
		1000	4,30	3,65
		1225	5,50	4,60
		1450	6,60	5,60
	595	1100	2,75	2,30
		1550	4,00	3,35
		2000	5,40	4,55
		2450	6,90	5,85
		2900	8,30	7,00
	775	1250	2,00	1,70
		2200	3,80	3,20
		3150	5,70	4,80
		4100	7,80	6,55
		5050	9,75	8,35
	1050	1400	1,30	1,05
		2750	2,75	2,35
		4100	4,40	3,65
		5450	6,00	5,00
		6800	7,75	6,50

90° Throw with the horizontal

90°	Dimensions (mm)	Flow Rate V (m^3/h)	Penetration	
			Δt_O = 10° C	Δt_O = 15° C
	425	550	2,50	1,90
		775	3,80	2,85
		1000	5,35	4,00
		1225	6,85	5,00
		1450	8,25	6,25
	595	1100	3,15	2,35
		1550	4,90	3,65
		2000	6,65	5,00
		2450	8,40	6,40
		2900	10,65	8,05
	775	1250	2,20	1,65
		2200	4,35	3,25
		3150	6,80	5,15
		4100	9,45	7,05
		5050	12,00	9,00
	1050	1400	1,40	1,10
		2750	3,30	2,45
		4100	5,35	4,00
		5450	7,50	5,65
		6800	10,00	7,50

Technical Data

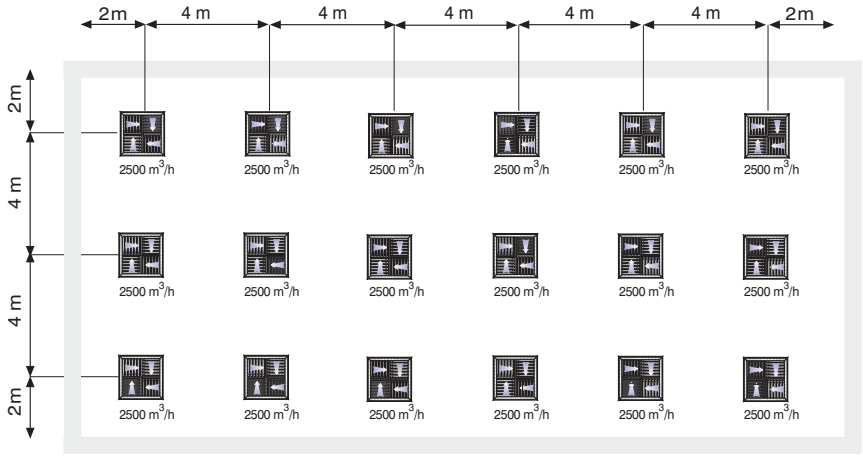
Temperature gradients along the throw path are read from the table below, depending on the Δt_O, Δt_L and throw length values. The temperature of the core at L metres from the diffuser, differs from the room temperaturey the value read from the tables. The difference is plus in heating and minus in cooling. The less the difference, the better the comfort conditions.

Temperature gradients along the throw path

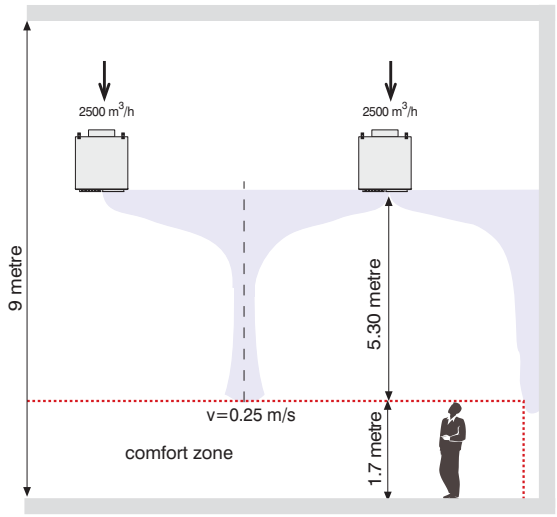
Size C_E/C_B (ØE) mm	Throw (L) m	Δt_L (°C) Values / Δt_0 (°C) 4	6	8	10	12	14
425	2	0,75	1,13	1,50	1,88	2,26	2,63
	3	0,50	0,76	1,01	1,26	1,51	1,76
	4	0,38	0,56	0,75	0,94	1,13	1,32
	5	0,30	0,45	0,61	0,76	0,91	1,06
	6	0,25	0,38	0,50	0,63	0,75	0,88
	7	0,21	0,31	0,42	0,52	0,63	0,73
	8	0,19	0,28	0,37	0,47	0,56	0,65
595	3	0,75	1,13	1,50	1,88	2,26	2,63
	4	0,57	0,85	1,14	1,42	1,70	1,99
	5	0,45	0,68	0,90	1,13	1,36	1,58
	6	0,37	0,56	0,75	0,93	1,12	1,31
	7	0,32	0,48	0,64	0,80	0,96	1,12
	8	0,28	0,42	0,56	0,70	0,84	0,98
	9	0,25	0,37	0,50	0,62	0,75	0,87
	10	0,22	0,33	0,44	0,56	0,67	0,78
	11	0,20	0,30	0,40	0,50	0,60	0,70
	12	0,19	0,28	0,37	0,47	0,56	0,65
775	3	1,00	1,50	2,00	2,50	3,00	3,50
	4	0,76	1,13	1,51	1,89	2,27	2,65
	5	0,60	0,90	1,20	1,50	1,80	2,10
	6	0,50	0,76	1,01	1,26	1,51	1,76
	7	0,43	0,64	0,86	1,07	1,28	1,50
	8	0,37	0,56	0,75	0,94	1,12	1,31
	10	0,30	0,44	0,59	0,74	0,89	1,04
	12	0,25	0,37	0,50	0,62	0,74	0,87
	14	0,21	0,32	0,43	0,54	0,64	0,75
	16	0,18	0,27	0,37	0,46	0,55	0,64
1050	3	3,46	5,19	6,92	8,65	10,38	12,11
	4	2,55	3,82	5,10	6,37	7,64	8,92
	5	2,05	3,07	4,10	5,12	6,14	7,17
	6	1,68	2,51	3,35	4,19	5,03	5,87
	8	1,25	1,87	2,50	3,12	3,74	4,37
	10	1,00	1,49	1,99	2,49	2,99	3,49
	12	0,83	1,24	1,66	2,07	2,48	2,90
	14	0,70	1,06	1,41	1,76	2,11	2,46
	18	0,55	0,83	1,10	1,38	1,66	1,93
	22	0,44	0,66	0,88	1,10	1,32	1,54

Example:

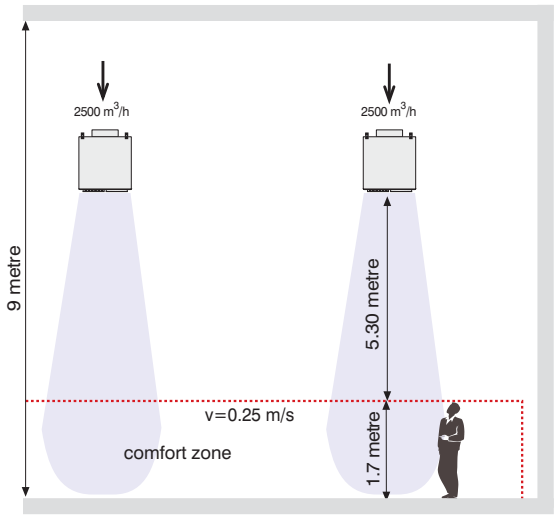
Air at 45000 m^3/h, is to be supplied into a room with dimensions 24 x 12m, and a height of 9 m . The diffusers are to be installed 7m above the floor.The supply air is 8^oC below room temperature for cooling, and 12^oC above it for heating. 18 diffusers will be used. Determine diffuser spacings so that the core velocity in comfort zone is below 0.25 m/s.



Cooling



Heating



Solution:

1) Diffusers are placed on the ceiling plan symmetrically.

2) Air flow rate per diffuser is calculated as 45000 / 18 = 2500 m^3/h.

3) Calculation of path length to the comfort zone:

Minimum distance: L= 5.30 + 2.00 = 7.30 m

4) From the tables on page 6; the most suitable size is found as 595x595 mm; for 2500 m^3/h and 7.30 m throw.

5) From the same table with interpolation, pressure loss is read as 80 Pa and sound power level as 58 dB(A).

6) From the table on page 9; for 595x595 mm size, $\Delta to = 8^oC$, and 7.30 m throw, Δt_L is found by interpolation as 0.61^oC.

7) From the table on page 8, the vertical throw (penetration) is found to be 7.8m.

8) From the table on page 9; for 595x595 mm size, $\Delta t_o = 12^oC$, and 7.80 m throw, Δt_L is found by interpolation as 0.96^oC.

Specification Text

Air diffuser to distribute supply air from the ceiling, with a spiral motion given by adjustable blades. The diffuser will be manufactured from ETIAL-60 norm Aluminium profiles, and after chromating process, it will be painted to ordered request with electrostatic powder paint and a minimum thickness of 60μ.Optionally, the blades will be operated by a servomotor. The plenum box will be manufactured from 0.6 mm galvanized steel sheets by seams. There will be 4 hanging rackets on the box.

Also, optionally, 6-mm thick acoustic foam (according to BS 476 Part 6 & 7 Class 0) will be installed inside the plenum box. For top inlet conditions, a perforated and galvanized steel plate will be installed in the plenum box.

Order Code

Model	CPJ.	32.	AA.	10-	425 -	9010
Frame		32 mm			C_E/C_B (mm) Refer to pages 3	Indicate RAL colour code
Accessories			**AA** .Without accessories **KA**..With motor bracket and without protection cage **MA**.With motor and without protection cage **AK**..Without motor and with protection cage **KK**..Without motor bracket and protection cage **MK**.With motor and protection cage			
Installation				**00**...Without screw holes **10**...With screw holes **30**...Concealed fixing	**Standard Dimensions**	**Colour code**

Plenum Box Installation Order Code

Model (Top inlet)	PLA.	10.	S	B.	1	1-	425 x 500 x 244 x 1
Model (Side inlet)	PLC						Please indicate if special dimensions are requsted K_E / K_B x H x ØD (mm) x s (no.of inlet spigots)
Installation		**10**...With screws **30**...Concealed fixing					
Box Inlet			**S** ....Side inlet **T**.....Top inlet				
Spigot Damper				**A** ....Without damper **B** ....Externally opeerated **C** ....Internally operated			
Perforated Rectifier Plate					**0**.....Without plate **1**.....With plate		
Insulation						**0**.....Without insulation **1**.....With acoustic insulation	**Plenum Box Dimensions**

C.16.10.EN.00

C CPJ Swirl Diffuser

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